METHOD AND DEVICE FOR APPLYING AN IMPRINT OR LABEL TO AN OBJECT

The present invention relates to a method for applying an imprint or label to an object, such as a container, in which a support belt bearing separated labels is fed to an application head, the labels being attached to the support belt by a support side and being provided with an adhesive on an application side, an object is fed to the application head, and the adhesive of the label is brought into contact with the object with the aid of the application head.

This method is known in the prior art. According to the known method, a support belt with separated labels on it is fed from a stock roll to an application head. Then, the labels are applied to an object, such as a container, using the application head. In this way, it is possible, for example, to arrange an image on the side of a beer crate.

The method is suitable, inter alia, for so-called "image transfer" labels. The labels can be transferred with the aid of pressure. In the present description, these labels are also referred to as "pressure-sensitive". These labels are transferred onto an object by pressing the adhesive on the application side of the labels onto an object with the aid of the application head. To ensure that the label is transferred, the adhesive force between the object to be printed and the label must be greater than the adhesive force between the label and the support belt.

The transfer of a pressure-sensitive label is facilitated if the initial adhesive force between the label and the crate is relatively great. This initial adhesive force is also known as the "first tack". This first tack is the determining factor for the adhesive force between the label and the object throughout the entire service life of the printed object. After application, the adhesive of the label will set, with the result that the adhesive force between the label and the object increases.

In practice, it is desirable for a user to be able to remove a label which has been applied to an object from the object again. The removal of a label is necessary, for example, if the label is damaged or out of date.

Beer crates, for example, are suitable for reuse. The presentation of the beer crate is dependent primarily on the quality of the label attached to the crate. It is quite possible that the crate itself is still eminently suitable for use while the imprint is

damaged. It is also possible that the beer manufacturer wants to use the imprint to draw attention to a temporary offer or a special promotion. In all these situations, it is desirable for it to be possible to remove the label from a crate and replace it with a new label.

It has already been explained above that to apply a pressure-sensitive label, it is desirable for the label to be fixed to the crate with a high first tack. It will be clear that the requirement that it be possible to remove the labels from the crate will in fact impose a maximum possible first tack. This is because the higher the first tack, the more difficult it will become to remove a label from a crate. With a high first tack, the label may be attached so well to a crate that, as a result of the adhesive used hardening, removing the label will cause problems.

Therefore, a significant drawback of the method according to the prior art is that, firstly, successful application of a pressure-sensitive layer requires a high first tack, while to allow a label to be removed, the opposite (a relatively low first tack) is in fact required.

Image transfer may also take place by applying the labels to an object using a combination of pressure and heat. In the present description, labels of this type are also referred to as "heat transfer" labels. Heat transfer labels of this nature are transferred from a support belt to an object under the influence of both heat and pressure. To ensure that the labels come off the support belt and are securely attached to an object, the labels are pressed onto an object under a relatively high pressure, at a relatively high temperature and for a relatively long time. The higher the operating temperature, the higher the associated costs will be.

The same is true of the amount of time taken up by the application of the labels. The longer the time required to apply a label, the higher the associated costs per label will become.

In the same vein as the comment made above for the pressure-sensitive labels, the application of heat-transfer labels also necessitates a compromise in the process conditions during application of the labels. On the one hand, the operating pressure and the operating temperature have to be set at as high a level as possible, in order to be able to ensure good transfer of a label from the support belt to an object, while on the other hand the temperature and the pressure have to be kept as low as

possible in order to enable a label to be removed from the object during its service life. Furthermore, it is important to minimize the costs involved in applying the labels.

In view of the above, one object of the invention is to provide a method of the above type in which a good transfer of labels from a support belt to an object can be achieved using a relatively low pressure from the application head. Moreover, in the case of heat-transfer labels, it is desirable that the temperature used should be kept at a relatively low level.

In the present invention, this object is achieved by the fact that the support belt is deformed upstream of the application head in such a manner that the adhesion of the support side of the label to the support belt is reduced. It is possible for the support belt to be deformed by moving the support belt over an edge or strip. Furthermore, it is possible for the support belt to be deformed over an angle between 45° and 90°.

According to the invention, the support belt is deformed, for example by being guided over an edge or strip. The material of the support belt is bent at the location of the strip, so that the support belt forms a bend of relatively small radius. This bend is determined by the shape of the contact surface between the strip and the support belt. If this shape is selected correctly, it is impossible for the material of the label to completely follow the deformation imposed. This means that the holding forces between the label and the support belt are reduced as a result.

As a consequence of static electricity, the label will still remain in place on the support belt. However, the adhesion between the label and the support belt will decrease considerably. As a result, the application of the image-transfer label can take place under conditions which on the one hand are favourable for the application of the labels and on the other hand allow the labels to be removed.

In the case of pressure-sensitive labels, if the first tack remains constant, the adhesive force between an object to be printed and the label will increase in relative terms compared to the adhesive force between the label and the support belt. This makes it possible to ensure that the labels are transferred successfully with a lower first tack. In the case of heat-transfer labels, the result is that the labels can be applied more quickly (in a shorter time), using a lower pressure and at a lower temperature.

According to the invention, it is possible for the label to comprise substantially ink and adhesive. Furthermore, it is possible for the label to be heated when it is applied to an object.

As has already been stated above, the method according to the invention is primarily suitable for image transfer in which pressure-sensitive and heat-transfer labels are used. The application of the latter type of labels requires the introduction of heat. By forming the label from ink and adhesive, it is possible to form a relatively thin label.

With a view to positioning, it is not advantageous if a label can "float" above a support belt. It is desirable for at least part of the label still to be held on the support belt with a sufficient adhesive force at the moment at which a printing operation begins. This can be achieved if only the upstream part of each label is deformed. Another option is to deform the support belt in the vicinity of the application head, at least the upstream end of the label being clamped between the object which is to be printed and the application head before the support belt is deformed at the downstream end of the label.

The effect of this measure is that the upstream part of a label is clamped securely between an object to be printed and the application head, while at least the downstream part of the label is still correctly positioned and is attached to the support belt.

According to the invention, it is possible for the label and the support belt to be fed past the application head, the adhesive of the label being brought into contact with the object as a result of the application head acting on the support belt.

This means that the support belt together with the labels attached to it moves between the objects to be printed and the application head.

As an alternative, it is possible for the support belt to be removed upstream of the application head. This means that the support belt is diverted away ahead of the application head. Only the labels are fed to the application head. This means that the application head may be in the form of a brush, with the aid of which the labels are rubbed onto an object.

It should be noted that it is known in the prior art for a support belt with labels on it to be fed towards an application head, with the support belt itself being diverted away ahead of the application head and only the labels being fed to the application head. The labels are detached from the support belt by diverting the support belt through an acute angle which the labels cannot follow or cannot follow to a sufficient extent. However, a significant difference needs to be noted between this

known method and the method according to the invention. According to the prior art, the labels are attached to the support belt by means of a support side. The labels are detached from the support belt and then pressed against an object by the support side. According to the invention, the label is attached to the support belt by a support side. After the label has been detached from the support belt, the label is attached to the object by the opposite application side.

A further possibility according to the invention is that the support belt, downstream of the application head, is moved past a removal strip, in such a manner that labels which have remained on the support belt are removed from the support belt by the removal strip.

The effect of this measure is that any labels which have run through, that is to say labels which have not been pressed onto objects by the application head, are removed from the support belt. This ensures that these unused labels cannot contaminate the device. After it has moved past the application head, the support belt is generally moved onwards with the aid of pressure rollers. These pressure rollers, like the application head, will preferably exert an influence on the label. The pressure which is present may cause the label to be pressed securely onto one of the conveyor rollers. This causes these conveyor rollers to become contaminated. This contamination can be prevented by the removal strip.

In addition to the method discussed above, the invention also relates to a device which is clearly intended for carrying out this method. The device according to the invention comprises a frame, an application head which is attached to the frame and is displaceable with respect to the frame, means for feeding a support belt towards the application head, separated labels being arranged on the support belt, and means for removing the support belt from the application head towards a removal roll.

The device according to the invention is characterized in that the device comprises a bending member which is arranged upstream of the application head, in or in the vicinity of the path of the support belt, which bending member comprises a contact surface which extends substantially transversely with respect to the direction of movement of the support belt, in such a manner that the support belt, in use, moves over the contact surface of the bending member. In this device, it is possible for the bending member to be positioned in the vicinity of the application head.

As has been indicated above, it is advantageous that the position of the labels with respect to the support belt should be unable to shift without it being possible to monitor this shift. If the strip or guide is therefore arranged in the vicinity of the application head, the upstream part of the label will already be clamped in place while the downstream part is still to move over the guide or strip. This ensures grouped positioning of the labels on the support belt.

Furthermore, it is possible for the distance between the bending member and the application head to be adjustable. This measure allows the device to be adapted to any length of labels.

According to the invention, it is possible for the application head to be designed as a roller. In use, a support belt can be clamped between the object to be printed and the roller. At the same time, the support belt can be conveyed by the roller.

As an alternative, the application head may be designed as a brush. In some applications, it is desirable for the support belt not to be guided between the object to be printed and the application head. In such a case, it is possible for only the label to be brushed onto an object.

To ensure secure attachment of the labels, it is also possible for that side of the application head which faces towards the object to be printed to be provided with a substantially curved recess.

Furthermore, it is possible for the device to comprise a removal strip which is positioned downstream of the application head, in the path of the support belt.

This removal strip can be used to remove any labels which have remained on the support belt from the support belt, thus preventing labels from contaminating the device.

The present invention will be explained in more detail with reference to the appended figures, which show a possible embodiment of the invention. In the drawing:

Figure 1 shows a diagrammatic overview of the application of a label to the side of a crate with the aid of an application head.

Figure 2 shows a diagrammatic overview of the application device shown in Figure 1, with the addition of a removal strip.

Figure 3 shows a diagrammatic overview of the application of a label to the side of a crate, with the support belt being deflected away ahead of the application head and with the application head being designed as a brush.

Figure 4 shows a diagrammatic overview of the application of a label to the side of a bottle in a carousel with the aid of an application head, with a recess arranged in the application head.

Figure 5 shows a diagrammatic overview of the application of a label to the side of a bottle, with the support belt being deflected away ahead of the application head and with the application head designed as a brush.

Figure 1 shows a conveyor device, such as a conveyor belt 1, on which crates 2 are positioned. In the drawing, these crates 2 are moving from the left to the right. With the aid of the conveyor belt 1, the crates 2 are moved past an application head 3. This application head 3 is arranged movably and can be made to act on the side wall of the crates 2 as a result of the application head being displaced in the direction of the arrow 4.

From a stock roll (not shown), a support belt 5 is fed towards the application head 3. Imprints or labels 6 are arranged on one side of this support belt 5. These labels are, for example, pressure-sensitive labels. Labels of this nature are referred to in the description as pressure-sensitive labels. Labels of this nature are attached to an object by an application head which applies pressure. The labels 6 may also be heat-sensitive labels. Labels of this type are referred to in the present description as heat-transfer labels.

The labels 6 are pressed against the side wall of the crates 2 with the aid of the application head 3. To achieve a successful printing operation, it is necessary for it to be possible for that side of the labels 6 which faces towards the crates 2 to be attached to the side wall of the crates with sufficient adhesive force. This side of the labels 6 which faces towards the crates is referred to as the "application side" of the labels. The adhesive force between the crates 2 and the application side of the labels 6 has to be sufficiently great to allow the labels to be pulled off the support belt 5.

In the case of pressure-sensitive labels, the initial adhesive force between the crates 2 and the application side of the labels 6 is also referred to as the "first tack". This first tack is the decisive factor for the ultimate adhesive force between the crates 2 and the labels 6 throughout the service life of the crates and the labels.

After the labels 6 have been attached to the crates 2, the adhesive used will start to set. As a result, the adhesive force between the labels 6 and the crates 2 will increase. If a user wishes to change the labels 6 on the side walls of the crates 2 from time to time, for example because the labels are damaged, it is necessary for the labels 6 to be relatively easy to remove from the crates 2. This means that a maximum has to be imposed on the adhesive force between the crates 2 and the labels 6. For this reason, it is desirable for the labels 6 to come off the support belt 5 successfully without the adhesive force between the labels 6 and the crates 2 becoming excessive.

According to the invention, removal of the labels 6 from the support belt is facilitated by guiding the support belt over a strip 7. As can be seen from Figure 1, this strip 7 is positioned upstream of the application head 3. The top side of the strip 7 forms a relatively acute angle. The presence of this acute angle will cause local deformation of the support belt 5. The label on the support belt will be unable to follow this deformation. Consequently, the adhesion between the label 6 and the support belt 5 is reduced. That part of the labels 6 which has moved over the point of the strip 7 comes free, as it were, from the support belt 5 and is therefore resting loosely on the belt 5. The adhesion of the labels 6 to the support belt 5 is less great, so that it will be less difficult to detach the labels 6 from the support belt 5. The initial adhesive force, or first tack, which is required to ensure that the labels 6 come off the support belt 5 and remain in position on the crates 2 is thus reduced.

It is possible for the entire extent of the labels 6 to be moved over the acute part of the strip 7. This means that the labels 6 "come off" the underlying support belt 5 over their entire area. The separation between the labels and the support belt 5 may be so great that the labels 6 may start to shift with respect to the underlying support belt 5. This shifting represents a drawback, since it makes the position of the labels 6 on the support belt 5 uncertain. As a result, the quality of application of the labels 6 to the crates 2 will be lower. The labels may, for example, be positioned at an angle on the crates.

To prevent the labels 6 from starting to shift with respect to the support belt 5, it is possible for only parts of the labels 6 to be moved over the strip 7. This means that, for example, only the downstream part of the labels 6 is moved over the strip 7. In that case, the positioning of the labels 6 on the support belt 5 is ensured by the upstream part of the labels 6.

Another possibility is for the strip 7 to be positioned close to the application head 3. In this case, the distance between the strip 7 and the application head 3 can be controlled in such a manner that the downstream part of a label 6 has already been brought into engagement with a crate 2 at the moment at which the upstream part of the label 6 has not yet moved over the strip 7. This means that the positioning of the label 6 with respect to the support belt 5 is ensured throughout the entire application operation. It is possible for the strip 7 to be arranged movably in the vicinity of the application head 3. In this way, the distance between the application head 3 and the strip 7 can be adjusted, so that it is possible, for example, to apply labels of different dimensions.

As stated above, the method and the device according to the invention can be used to affix both a pressure-sensitive label and a heat-sensitive label. In the case of heat-sensitive labels or heat-transfer labels, the labels are forced against the object to be printed by an application head with heat being introduced.

Figure 2 shows a diagrammatic overview of the application device from Figure 1 with the application head 3 having been disengaged from the crate 2.

If the supply of crates 2 on the conveyor belt 1 is temporarily interrupted, a number of labels 6 will move past the application head 3 together with the support belt 5 without being transferred to a crate 2. This means that these labels 6 are lost. These unused labels 6 may contaminate the device downstream of the application head 3.

Generally, a so-called dispenser 10 will be positioned downstream of the application head 3. The dispenser 10 comprises two or more pressure-exerting rollers which convey the support belt 5. Since the dispenser 10 is arranged downstream of the application head, it is not generally a drawback if these rollers press against the surface of the support belt 5. However, if there are unused labels 6 resting on the support belt, the pressure-sensitive label 6 may become wound around one of the rollers of the dispenser 10. This means that, over the course of time, unused labels will remain stuck to the roller of the dispenser 10. From time to time, the dispenser 10 will therefore have to be replaced or cleaned. To prevent unused labels 6 from being able to reach the dispenser 10, it is advantageous if a removal strip 11 is positioned between the application head 3 and the dispenser 10. This removal strip 11 may, for example, be a metal strip, a relatively sharp point of which runs onto the surface of the support belt 5. At the location of the removal strip 11, the unused label 6 will be detached from the

support belt 5 and collected, for example, in a collection receptacle beneath the strip. This prevents contamination to the downstream dispenser 10.

Figures 1 and 2 show the situation in which the labels 6 are pressed onto a crate 2 by an application head 3 which acts on the labels 6 via the support belt 5. Figure 3 shows an alternative attachment method. The support belt 5 is deflected away before the application head is reached. This means that the labels are completely detached from the belt 5 and that the application head acts on the support side of the labels 6 while they are being affixed. Figure 3 also shows the situation in which the application head is designed as a brush 15. This brush 15 is used to rub the labels onto the crates 2.

The method and device according to the invention may also be used to affix labels to bottles, such as beer bottles. Figure 4 shows the situation in which the bottles 20 are printed with the aid of an application head 30. In this application head 30 there is a recess, the shape of which is such that the application head can partially surround the bottles 20. During application, the bottles move as a group in a carousel in the direction A. Moreover, the separate bottles 20 are rotating in the direction B. According to the embodiment shown in Figure 4, the application head 30 acts on the labels 6 via the support belt 5.

As an alternative, the embodiment shown in Figure 5 is also possible. In accordance with the embodiment shown in Figure 3, the support belt 5 is diverted away before it reaches the application head. Moreover, this application head is designed as a brush 31. Otherwise, the embodiment is identical to the embodiment shown in Figure 4.

Using the method and the device according to the invention, it is possible to impart an angle of between 45° and 90° to the film. Experiments have demonstrated that, with angular displacement of this nature, it is possible to impose deformations on the support belt without the label moving substantially with respect to the support belt while the support belt is being conveyed through the device. If smaller angles are used, the deformation of the support belt may be insufficient to ensure reduced adhesion of the label to the support belt.

Furthermore, experiments have determined that, with a support belt height of 200 mm, it is possible to impose a stress of approximately 5 kg on the support belt. It will be clear that these figures serve as examples and are not intended to limit the scope of protection of the present invention.